

AP BIOLOGY
Course Syllabus 2010-2011

Unit	Duration	Reading	Labs and assignments	Description
1. Our Biological relationships <ul style="list-style-type: none"> • Intro to AP Biology • Ecology <ul style="list-style-type: none"> ○ Ecosystems ○ Communities ○ Behavior ○ Populations ○ Invasive species ○ Human impact • Introduction to Evolution • Phylogeny and systematics 	3 cycles	1 50-55 22 & 24 25	<ul style="list-style-type: none"> • Summer Ecology Project • Student made Ecology Exam (summer) • AP Dissolved Oxygen Lab #12 • Speciation case study • AP Animal Behavior Lab #11 • Invasive species essay 	The title of this unit has two meanings: we will examine our relationships as a teacher and students to each other and to this demanding course and the AP/college level exams. We will also examine <i>ecological relationships</i> as we follow-up on your summer work. And what happens to these relationships if a new species enters the ecosystem? We can then see the important relationship between ecology and <i>evolution by natural selection</i> , an idea recognized by Darwin. Because we did so much with natural selection in sophomore biology, we will examine evolution by using the case study approach as we consider the biological problem of defining the term species. This case study will also help illustrate the <i>importance of these issues in our culture</i> .
2. Diversity of Organisms <ul style="list-style-type: none"> • Early Earth • Prokaryotes and Eukaryotes • Plants • Fungi • Animals 	2 cycles	26 27-28 29-30 21 32-34, 40	<ul style="list-style-type: none"> • Tree of Life Power Point Project • Evolutionary trends essay • Comparative anatomy dissection labs • RNA world essay 	In this unit we examine the basic characteristics of each of the major taxa that will be compared in later units. An emphasis will be on interpreting phylogenetic trees and the <i>evolutionary</i> trends that they present. What decisions must taxonomists make and what data must they use in the <i>process</i> of classification. We have had feedback from our graduates that we should have students create Power Point presentations. In this unit you will create Power Point presentations examining the characteristics of the taxa and their places on the “Tree of Life”.
3. Cells, Structures and Homeostasis <ul style="list-style-type: none"> • Cell structure • Membrane Structure • Plant structure • Transport in plants • Renal physiology • Regulating the Internal Environment 	3 cycles	7 8 35 36 37 42 44	<ul style="list-style-type: none"> • AP Diffusion Lab #1 • AP Transpiration lab # • Relating structure to function in water transport of plants and animals essay 	In this unit we examine the structure of cells and cell membranes within the context of how water is moved through organisms and how organisms adjust homeostatically to water and salt levels. This will provide an opportunity to examine adaptation in light of selection pressure (e.g. the impact of the environment on the anatomy of the nephron). In this way, we can build on the biochemistry of last unit and relate <i>cellular and organ structure to function</i> in both a chemical and <i>evolutionary</i> context.
4. Cell Physiology <ul style="list-style-type: none"> • Immune System • Cell communication • Endocrine system • Muscle physiology • Nervous system 	3 cycles	43 11 39, 45 49 48	<ul style="list-style-type: none"> • Regulation in the Endocrine System (explaining diagrams and flowcharts) Project • AP Cardiovascular lab #10 • Neurobiology lab (BSCS) 	Here we examine physiological systems based on last unit’s study of cells. Cell membranes contain surface markers—what do they do? How does the cytoskeleton relate to muscle function? How is the membrane responsible for maintaining electrical potentials? How did <i>scientists figure these things out</i> ? The <i>relationship between structure and function</i> will be easy to see now, so we will focus on another theme. You will complete a project in which you explain diagrams (flow charts) examining the functioning of the

				endocrine system and cell signaling mechanisms in <i>regulating</i> homeostasis and metabolism. By comparing endocrine functions in humans, insects and plants we can see the similarities and differences that provides evidence of <i>evolution</i> .
5. Cellular Energetics <ul style="list-style-type: none"> Respiration and fermentation Animal Nutrition Photosynthesis Plant Nutrition 	2 cycles	9 41 10 37	<ul style="list-style-type: none"> AP Photosynthesis lab #4 AP Respiration lab #5 Follow that carbon (or other nutrient) art project 	Could life be a game of hot potato with carbon, hydrogen, oxygen and other molecules? How are mitochondria and chloroplasts <i>related</i> in the carbon/oxygen cycle? How is energy transferred within an <i>ecosystem</i> ? How have animals and plants <i>evolved</i> to obtain energy and nutrients? In this unit we build on your knowledge of photosynthesis and respiration from sophomore year and then relate to the first unit's analysis of nutrient cycles. By preparing detailed art works, you can follow energy or a carbon atom (or other assigned molecule) through an ecosystem including what happens to it within organisms.
6. Continuity and Change <ul style="list-style-type: none"> Cell Cycle Meiosis Mendel Population genetics and evolution Molecular genetics Control of genetics Genetic Technology 	4 cycles	12 13 14-15 16-17 23 18-19 20	<ul style="list-style-type: none"> AP Mitosis lab#3A AP Meiosis lab #3B AP Fruit Fly lab #7 AP Population Genetics lab #8 AP Molecular biology lab #6 (done at BU CityLab Experiment (field trip)) Some of these labs will carry over into the next unit. 	How can one cell <i>make exact copies</i> and become trillions of cells? How can all those cells have the same genes but look and act differently? How can this process <i>sometimes go wrong</i> (in both good and bad ways)? Why are my kids like my wife and me and yet different from both of us? How is <i>variation</i> generated? This is a unit that gets a strong emphasis during sophomore biology. In AP Bio we will build on that background by emphasizing (<i>by doing</i>) <i>the thought processes and experiments</i> that have brought science (and <i>society</i>) to where it is now. We will even be able to genetically engineer bacteria in a university lab! This unit will integrate cell reproduction, molecular genetics, heredity, population genetics and <i>evolution</i> .
7. Chemistry of Life <ul style="list-style-type: none"> Basic chem. Review Chemistry of water Carbon Macromolecules Metabolism and ATP 	2 cycles	2 3 4 5 6 (parts of 9)	<ul style="list-style-type: none"> AP Enzymes lab #2 Molecular Models lab McMush Lab Enzyme kinetics activity Molecular structure and function essay 	All of you have a great background in basic chemistry and the chemistry of water from your chemistry class last year. In this unit we will build on the biochemistry you learned in sophomore biology and delve deeper into the <i>relationship between molecular structure and molecular function</i> .
8. Growth and development <ul style="list-style-type: none"> Genetics of development Plant development Animal development 	2 cycles	21 38 46,47	<ul style="list-style-type: none"> "Funding for Stem Cells?" Case study Evo-Devo essay Genetics of Cancer essay 	This unit is really a continuation of the previous one and will contain information that was covered the least in sophomore biology. Here we will use our knowledge of <i>genetics</i> and <i>evolution</i> to examine how organisms develop into adults and how changes in that process can lead to evolution. We will frame these topics around two important <i>issues: stem cell research and cancer</i> .
9. Review <ul style="list-style-type: none"> Exploring the themes 	1 cycle		<ul style="list-style-type: none"> Student Power Point Presentations using examples to illustrate each AP Bio theme at each organizational level Practice AP Bio exam 	During the course, we have looked at themes that extend from the molecular level, through the organismal level, and to the population level. In this review unit, you will create power point presentations in which you present examples of the themes at each level. We will finish with a practice AP Bio exam that will count as part of the fourth term grade.